Work Order No. 03917.008.007

No. 1 and No. 2 Combination Boilers
Particulate Matter
Emission Compliance Test Report
Bowater Incorporated
Catawba, South Carolina
18 July 2006

Prepared For

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SECTION 1
INTRODUCTION

Weston Solutions, Inc. (WESTON®) was retained by Bowater Incorporated (Bowater) to conduct particulate matter (PM) emission testing on the No. 1 and No. 2 Combination Boilers at the mill in Catawba, South Carolina. The purpose of the testing was to demonstrate compliance with the South Carolina Department of Health and Environmental Control (DHEC) permit limits.

WESTON performed the emission testing during 18 July 2006. The project team was comprised of the following individuals.

Name	Project Role
Temp Simpkins	Project Manager/Test Team Leader
Wayne Roberts	Technical Director
Melanie Wright	Quality Assurance Manager
Bart McDaniel	Test Team Member
Justin Hall	Test Team Member
Natalie Hornsby	Report Coordinator

Ms. Jacquelyn Taylor of Bowater coordinated the testing with mill operations and served as WESTON's technical contact throughout the effort. A representative of DHEC was not present during the testing.

Table 2-1 presents a summary of the mean emission results for each source.

TABLE 2-1
SUMMARY OF EMISSION RESULTS

Parameter	Mean Results		
	No. 1 Combination Boiler	No. 2 Combination Boiler	Permit Limits
Particulate Matter			
Concentration, gr/dscf	0.030	0.034	----
Emission Rate, lb/hr	36	48	----
Emission Rate, lb/MMBtu	0.088	0.100	**0.6**

Tables 2-2 and 2-3 provide detailed summaries of the emission results, with comparison to the permit limit. Any differences between the calculated results presented in the appendices and the results reported in the summary tables are due to rounding for presentation.

TABLE 2-2
NO. 1 COMBINATION BOILER
SUMMARY OF PM EMISSION RESULTS

	Run 1	Run 2	Run 3	Mean
Date	7/18/06	7/18/06	7/18/06	----
Time Began	1510	1646	1811	----
Time Ended	1612	1752	1918	----
Stack Gas Data				
Temperature, °F	374	388	386	383
Velocity, ft/sec	57	58	58	58
Moisture, %	17	17	16	17
CO_2 Concentration, %	8.3	9.4	10.1	9.3
O_2 Concentration, %	11.5	10.1	9.4	10.3
VFR, x 10^5 dscfm	1.38	1.40	1.41	1.39
Particulate Matter				
Isokinetic Sampling Rate, %	101	101	101	101
Concentration, gr/dscf	0.056	0.016	0.019	0.030
Emission Rate, lb/hr	66	20	23	36
Emission Factor, lb/MMBtu	0.171	0.044	0.048	0.088
Permit Limit, lb/MMBtu	**----**	**----**	**----**	**0.6**

TABLE 2-3
NO. 2 COMBINATION BOILER
SUMMARY OF PM EMISSION RESULTS

	Run 1	Run 2	Run 3	Mean
Date	7/18/06	7/18/06	7/18/06	----
Time Began	0949	1130	1315	----
Time Ended	1056	1237	1423	----
Stack Gas Data				
Temperature, °F	408	416	420	415
Velocity, ft/sec	71	72	74	72
Moisture, %	18	14	16	16
CO_2 Concentration, %	8.3	9.2	8.4	8.6
O_2 Concentration, %	11.5	10.5	11.4	11.1
VFR, x 10^5 dscfm	1.64	1.72	1.71	1.69
Particulate Matter				
Isokinetic Sampling Rate, %	106	100	102	103
Concentration, gr/dscf	0.033	0.030	0.037	0.034
Emission Rate, lb/hr	47	44	55	48
Emission Factor, lb/MMBtu	0.103	0.083	0.114	0.100
Permit Limit, lb/MMBtu	**----**	**----**	**----**	**0.6**

SECTION 3
SOURCE TESTING METHODOLOGY

The emission testing program was conducted in accordance with the U.S. EPA Reference Methods summarized in Table 3-1. Method descriptions and quality assurance data are provided in the referenced appendices.

TABLE 3-1
SOURCE TESTING METHODOLOGY

Parameter	Method Number	Appendix Reference		Comments
		Method Description	Quality Control Data	
Volumetric Flow Rate	1,2,3A,4	B.1	F	
Particulate Matter	5	B.2	F	

Instrumental analysis was performed on integrated bag samples to determine oxygen (O_2) and carbon dioxide (CO_2) concentrations.

Post-test equipment calibrations for the probe and pitot will be maintained on file at WESTON.

APPENDIX A
SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

No. 1 Combination Boiler
Run No. 1

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6\ in.\ H_2O/in.\ Hg}$$

where, Pb = barometric pressure, in. Hg
ΔH = Pressure differential of orifice in. H_2O

$$Pm = 29.41\ in.\ Hg + \frac{1.325\ in.\ H_2O}{13.6\ in.\ H_2O/in.\ Hg} = 29.51\ in.\ Hg$$

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6\ in.\ H_2O/in.\ Hg}$$

where, Pb = barometric pressure, in. Hg
Pg = Static Pressure, in. H_2O

$$Ps = 29.41\ in.\ Hg + \frac{-0.50\ in.H_2O}{13.6\ in.\ H_2O/in.\ Hg} = 29.37\ in.\ Hg$$

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.64\,°R/in.\ Hg\ \ x\ Y\ \ x\ Vm\ \ x\ Pm}{Tm}$$

where, Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, °R

$$Vmstd = \frac{17.64\,°R/in.\ Hg\ \ x\ 1.003\ \ x\ 39.347\ cf\ \ x\ 29.51\ in.\ Hg}{557\,°R} = 36.880\ dscf$$

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707\ ft^3/mL\ x\ Vlc$$

where, Vlc = volume of H_2O collected, mL

$$Vwstd = 0.04707\ ft^3/mL\ x\ 159.0\ mL = 7.484\ scf$$

Moisture Fraction (Measured), (Bws)

$$Bws = \frac{Vwstd}{(Vwstd + Vmstd)} = \frac{7.484\ scf}{7.484\ scf\ +\ 36.880\ dscf} = 0.169$$

where, Vwstd = standard wet volume, scf
Vmstd = standard meter volume, dscf

Moisture, % (M%)

$$M\% = Bws\ x\ 100 = 0.169\ x\ 100 = 16.9$$

where, Bws = moisture fraction, measured or at saturation, whichever is lowest

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44\ x\ \%\ CO_2) + (0.32\ x\ \%\ O_2) + (0.28(100 - \%\ CO_2 - \%\ O_2))$$

$$Md = (0.44\ x\ 8.3) + (0.32\ x\ 11.5) + (0.28(100 - 8.3 - 11.5)) = 29.79\ lb/lb\text{-}mole$$

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md\ (1 - Bws) + 18(Bws)$$

where, Md = molecular weight (DRY), lb/lb-mole
Bws = moisture fraction, dimensionless

$$Ms = 29.79\ lb/lb\text{-}mole\ (1 - 0.169) + 18(0.169) = 27.80\ lb/lb\text{-}mole$$

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(°R)(in.\ H_2O)}}\ x\ Cp\ x\ \sqrt{Delta\ P}\ avg.\ x\ \sqrt{\frac{Ts}{Ps\ x\ Ms}}$$

where, Cp = pitot tube coefficient
Delta P = velocity head of stack gas, in. H_2O
Ts = absolute stack temperature, °R
Ps = absolute stack gas pressure, in. Hg
Ms = molecular weight of stack gas, lb/lb-mole

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(°R)(in.\ H_2O)}}\ x\ 0.84\ x\ 0.783\ in.\ H_2O\ x\ \sqrt{\frac{834\ °R}{29.37\ in.\ Hg\ x\ 27.80\ lb/lb\text{-}mole}}$$

$$Vs = 56.83\ ft/sec$$

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60\ sec/min\ x\ Vs\ x\ As$$

where, Vs = stack gas velocity, ft/sec
As = cross-sectional area of stack, ft^2

$$Qa = 60\ sec/min\ x\ 56.83\ ft/sec\ x\ 78.54\ ft^2 = 2.68\ E+05\ acfm$$

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.64 \frac{°R}{in.\ Hg}\ x\ Qa\ x\ (1 - Bws)\ x\ \frac{Ps}{Ts}$$

where, Qa = average stack gas flow at stack conditions, ft^3/min
Bws = moisture content (dimensionless)
Ps = absolute stack gas pressure, in. Hg
Ts = absolute stack temperature, °R

$$Qs = 17.64 \frac{°R}{in.\ Hg}\ x\ 2.68\ E+05 \frac{acf}{min}\ x\ (1 - 0.169)\ x\ \frac{29.37\ in.\ Hg}{834\ °R} = 1.38\ E+05\ dscfm$$

Percent Isokinetic Sampling Rate (%I)

$$\%I = \frac{0.0945(in.Hg)(min)/(°R)(sec)\ x\ Ts\ x\ Vmstd}{Ps\ x\ Vs\ x\ An\ x\ \Theta\ x\ (1 - Bws)}$$

where, Ts = avg. stack temperature, °R
Vmstd = standard meter volume, dscf
Ps = absolute stack gas pressure, in. Hg
Vs = stack gas velocity, ft/sec
An = cross-sectional area of nozzle, ft^2
Θ = total sampling time, min
Bws = moisture content (dimensionless)

$$\%I = \frac{0.0945(in.Hg)(min)/(°R)(sec)\ x\ 834°R\ x\ 36.880\ dscf}{29.37\ in.Hg\ x\ 56.83\ ft/sec\ x\ 3.46\ E\text{-}04\ ft^2\ x\ 60\ min\ x\ (1 - 0.169)}$$

$$\%I = 100.8$$

Particulate Matter Concentration at Standard Conditions (Cs), gr/dscf

$$Cs = 15.43\frac{gr}{g}\ x\ \frac{Mn}{Vmstd} = 15.43\frac{gr}{g}\ x\ \frac{0.1327\ g}{36.880\ dscf} = 0.056\ gr/dscf$$

where, Mn = particulate matter collected, g
Vmstd = std. meter volume, dscf

Particulate Matter Emission Rate (PMR), lb/hr

$$PMR = \frac{Cs\ x\ Qs\ x\ 60\frac{min}{hr}}{7000\frac{gr}{lb}}$$

where, Cs = particulate conc. at std. cond., gr/dscf
Qs = avg. stack gas flow at std. cond., dscf/min

$$PMR = \frac{0.056\ x\ 1.38\ E+05\ x\ 60\frac{min}{hr}}{7000\frac{gr}{lb}}$$

$$PMR = 65.8$$

PM Emission Factor (EMF), lb/MMBtu (correcting for O_2)

$$EMF = PM\ conc. \frac{gr}{dscf} x \frac{lb}{7{,}000\ gr} x\ F\text{-}Factor, \frac{dscf}{MMBtu} x \frac{20.9}{20.9 - \%\ O_2}$$

where, Pm conc. = Cs
F-Factor = defined by client or CFR, scf/MMBtu

$$EMF = 0.056 \frac{gr}{dscf} x \frac{lb}{7{,}000\ gr} x\ 9{,}680 \frac{dscf}{MMBtu} x \frac{20.9}{20.9 - 11.5}$$

$$EMF = 0.1707$$

Prorated F-Factor Calculation

$$Prorated\ F\text{-}Factor = \frac{(9{,}600 \frac{dscf}{MMBtu} x 65\%) + (9{,}190 \frac{dscf}{MMBtu} x 29\%) + (15{,}500 \frac{dscf}{MMBtu} x 5\%)}{100}$$

$$Prorated\ F\text{-}Factor = 9{,}680\ dscf/MMBtu$$

where, 9,600 dscf/MMBtu is the Bark F-Factor
9,190 dscf/MMBtu is the Oil F-Factor
15,500 dscf/MMBtu is the TDF F-Factor

APPENDIX B
TEST METHODOLOGY

B.1 VOLUMETRIC FLOW RATE

B.2 PARTICULATE MATTER

B.1 VOLUMETRIC FLOW RATE

Mass emission rates are calculated by multiplying measured target analyte concentrations by calculated volumetric flow rates. Volumetric flow rates are calculated using measurement data obtained by EPA Reference Methods 1-4.

The ductwork is measured at the sample location to the nearest 0.25 inch using a steel tape measure. Traverse points are selected in accordance with EPA Reference Method 1 on the basis of ductwork dimensions, geometry, and upstream and downstream disturbances. When a sample location does not meet EPA Reference Method 1 criteria, the maximum recommended number of traverse points is used.

Gas Velocity

The velocity of the gas stream is measured in accordance with EPA Reference Method 2 by reading the instantaneous velocity pressure with an inclined manometer at each traverse point using either a standard "P" type or an "S" type pitot tube. The stack pressure is calculated from the measured static pressure of the stack and the ambient barometric pressure. The static pressure is measured by using the static side of the pitot tube, and the barometric pressure is measured using a calibrated aneroid barometer. Magnahelic® gauges with scales of 0 to 5 and 0 to 25 inches of water or an inclined manometer with a scale of 0 to 10 inches of water are used for velocity pressure measurements. Manometer selection is determined by the velocity pressure of the gas stream. A manometer with a 0 to 0.25 inch scale may be used when the velocity pressure of the gas stream is less than 0.02 inches of water. By convention, any measured velocity pressures of less than 0.005 inches of water are recorded and reported as less than 0.005 inches of water. The stack temperature is measured with a calibrated thermocouple and pyrometer.

For low velocity pressure measurements (less than 0.005 inches of water) a hot wire anemometer may be used to measure the velocity of the gas stream. The indicated velocity is used without correction when the gas stream is ambient air with a moisture content of less than 65%. The indicated velocity is corrected in accordance with procedures specified by the manufacturer when the moisture content exceeds 65% or when the dry gas fraction is something other than ambient air.

Gas Composition and Moisture Content

The composition of the gas stream is measured in accordance with EPA Reference Method 3A using an analyzer.

Integrated samples are collected by withdrawing a sample from the source through a moisture condenser into a Tedlar® sample bag. The bag is then analyzed using a calibrated O_2/CO_2 analyzer.

The moisture content of the gas stream is determined using one of the following procedures:

- For sources requiring testing by EPA Reference or Test Methods 5, 8, 12, 13, 17, 23, 26A, 29, 0010, or 0011, moisture is determined by EPA Reference Method 4. At the conclusion of each run the volume of condensed moisture in the impingers of the sampling train is measured and used to calculate the moisture content of the gas stream.

- For sources with temperatures greater than 212 °F, the approximation technique described in EPA Reference Method 4 may be used with midget impingers to condense moisture before dry gas volume measurement.

- For sources with a temperature of less than 212 °F, wet bulb/dry bulb temperature measurements may be made, and the moisture content calculated using vapor pressure tables.

When multiple methods are used for moisture determinations, the lowest moisture value is used for volumetric flow calculations.

The molecular weight of the gas stream is calculated using the measured moisture, oxygen, and carbon dioxide concentrations. The balance of the gas stream is assumed to be nitrogen. The volumetric flow is then calculated at stack and standard conditions using the calculated molecular weight, the measured stack temperature, and measured velocity, stack and barometric pressures. Standard conditions are 68 °F and 29.92 inches of mercury and 0% moisture.

Data Acquisition and Reporting

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed (where possible) with preprogrammed calculators or spreadsheet software.

Quality Control

Quality control procedures for volumetric flow measurements involve leak checks of pitot tubes, pitot tube lines and manometers; periodic analysis of ambient air and duplicate analysis of source gas samples with the Fyrite analyzer; triplicate analysis with the Orsat analyzer; and periodic calibration checks of thermocouples and pyrometers.

Data transfers are minimized. Data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

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B.2 PARTICULATE MATTER

Particulate matter (PM) emission testing is conducted using EPA Reference Method 5. EPA Reference Methods 1-4 are used, as appropriate, for traverse point selection, determination of stack gas molecular weight, stack gas moisture determination, and volumetric flow rate.

Sampling Equipment and Procedures

The sampling train utilized to perform the PM sampling is an EPA Reference Method 5 train manufactured by Graseby-Nutech, Graseby-Anderson, or Apex Instruments (see Figure B-1). A measured borosilicate, quartz glass, or stainless steel (316) nozzle is attached to a heated (248 ± 25 °F) borosilicate or quartz glass, or stainless steel probe of appropriate length. The probe is connected to a heated (248 ± 25 °F) borosilicate glass filter holder containing a 9-cm glass fiber filter (preweighed to a constant 0.1 mg weight). The first and second impingers each contain 100 mL of distilled water, the third impinger is empty, and the fourth impinger contains 200 to 300 grams of dry preweighed silica gel. The second impinger is a standard Greenburg-Smith type. The first, third, and fourth impingers are of a modified design. All impingers are maintained in a crushed ice bath. A gas measuring control console with a leak-free vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers are connected to the final impinger, probe, heated filter holder, and pitot tube via an umbilical cord to complete the train.

Flue gas velocity is measured with a calibrated S-type pitot tube (provided with extensions) fastened alongside the sampling nozzle. Flue gas temperature is monitored with a calibrated direct readout pyrometer equipped with a chromel-alumel (Type K) thermocouple positioned near the sampling nozzle. The probe, filter box, and impinger exit gas temperatures are monitored with a calibrated direct readout pyrometer equipped with Type K thermocouples positioned in the probe, heated filter chamber, and in the sample gas stream after the last impinger. Stack gas stream composition (carbon dioxide and oxygen content) is determined as previously described. The sampling rate is adjusted, based on stack velocity, at each point to ensure the sample is collected isokinetically.

At the conclusion of each test, the sampling train is leak checked. Upon completion of a successful leak check, the sampling train is dismantled, openings are sealed, and the components recovered as described below.

- The glass fiber filter(s) is/are removed from its holder with tweezers and placed in its original container, along with any particulate and filter fragments (Sample Fraction 1).

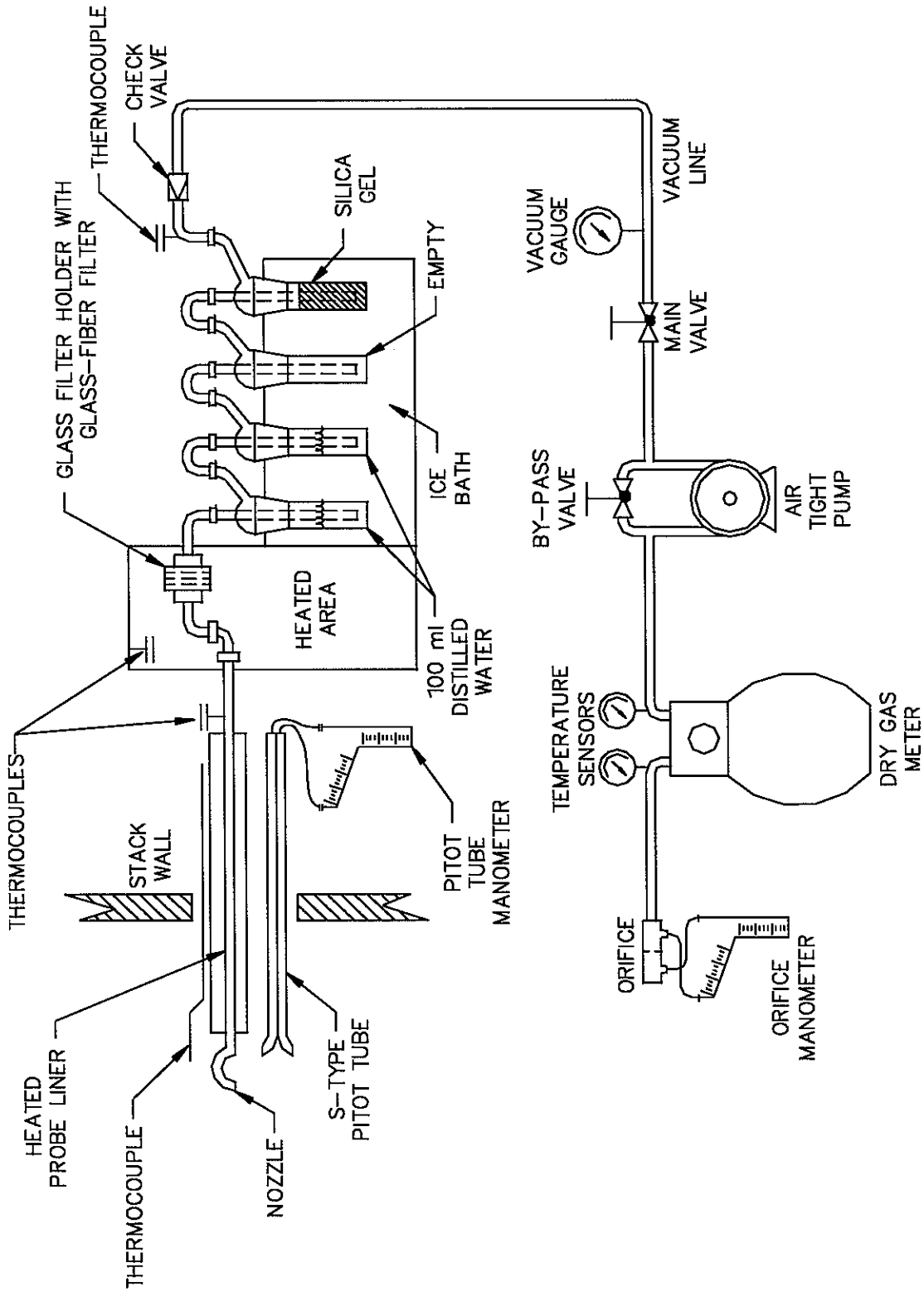

Figure B-1 EPA Reference Method 5 Sampling Train

- The probe and nozzle are separated and the particulate rinsed with distilled water or acetone into a polyethylene container while brushing a minimum of three times. Particulate adhering to the brush is rinsed with the appropriate solvent into the same container. The front half of the filter holder and connecting glassware are also rinsed. These rinses are combined (Sample Fraction 2).

- The total liquid content of impingers one, two, and three are measured volumetrically for stack gas moisture content calculation. This liquid is discarded.

- The silica gel is removed from the last impinger and immediately weighed to the nearest 0.1 g for stack gas moisture content calculation.

- Aliquots of the appropriate solvents and a filter are retained for blank analyses.

Each sample bottle is labeled to clearly identify its contents. The liquid level is marked on each bottle. The samples are then secured for transport to a laboratory for analysis. Sample integrity is assured by maintaining chain-of-custody records.

Sample Analysis

The particulate analysis proceeds as follows:

- The sample filters (Sample Fraction 1) and blank filter are desiccated for 24 hours and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weight.

- The nozzle, probe, and front half of the filter holder wash samples (Sample Fraction 2), along with the solvent blank, are evaporated in tared beakers, then desiccated and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weights.

The total weight of material measured in the front half wash in addition to the weight of material collected on the glass fiber filter represent the total PM catch for each train. Blank corrections are made where appropriate for all sample weights.

Data Acquisition and Reduction

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed with preprogrammed calculators or spreadsheet software. Data transfers are minimized. Field and laboratory data sheets are be checked for completeness and accuracy. Calculations are verified by a second person.

Quality Control

Dry gas meters are calibrated before and after sampling. Thermocouples are calibrated against mercury thermometers, and aneroid barometers are calibrated against a mercury barometer. WESTON participated satisfactorily in the most recent dry gas meter audit supplied by the EPA. Those data are on file at WESTON.

Prior to and following each run, the sampling train is leak checked. An acceptable leak rate does not exceed the lesser of 0.02 actual cubic feet per minute (acfm) or 4% of the actual sampling rate. The isokinetic sampling rate is calculated at the completion of each sample run. If the isokinetic sampling rate is not within 100% ± 10%, the sample run is repeated.

Samples are transported to the laboratory under chain-of-custody. Solvent blanks and filter blanks are analyzed at the same time as the samples. The mass collected on the filters and the mass in the probe wash are corrected by the blank measurements.

WESTON uses Class S weights during each stage of the analysis to verify the accuracy of the balance. The balance is repaired and recalibrated before proceeding if there is a significant difference in the actual mass and measured mass.

APPENDIX C
FIELD DATA – NO. 1 COMBINATION BOILER

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date		7/18/06	7/18/06	7/18/06	---
Time Began		310	1646	1811	---
Time Ended		412	1752	1918	---
	INPUT DATA				
Sampling Time, min	(Theta)	60	60	60	60
Stack Diameter, in.	(Dia.)	120.00	120.00	120.00	120.00
Barometric Pressure, in. Hg	(Pb)	29.41	29.41	29.41	29.41
Static Pressure, in. H2O	(Pg)	-0.50	-0.50	-0.50	-0.50
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	1.0030	1.0030	1.0030	1.0030
Orifice Calibration Value	(Delta H@)	1.7830	1.7830	1.7830	1.7830
Nozzle Diameter, in.	(Dn)	0.252	0.252	0.252	0.252
Meter Volume, ft^3	(Vm)	39.347	40.007	40.472	39.942
Meter Temperature, °F	(Tm)	97.0	102.5	102.3	100.6
Meter Temperature, °R	(Tm-R)	557.0	562.5	562.3	560.6
Meter Orifice Pressure, in. H2O	(Delta H)	1.325	1.352	1.369	1.349
Ave Sq Rt Orifice Press, (in. H2O)^½	((Delta H)½)avg)	1.145	1.158	1.163	1.155
Volume H2O Collected, mL	(Vlc)	159.0	158.6	157.6	158.4
CO2 Concentration, %	(CO2)	8.3	9.4	10.1	9.3
O2 Concentration, %	(O2)	11.5	10.1	9.4	10.3
Ave Sq Rt Velo Head, (in. H2O)^½	((Delta P)½)avg)	0.783	0.797	0.801	0.794
Stack Temperature, °F	(Ts)	374.0	388.0	386.2	382.7
Stack Temperature, °R	(Ts-R)	834.0	848.0	846.2	842.7
Particulate Collected, g	(Mn)	0.1327	0.0392	0.0461	0.0727
Moisture Fraction (at Saturation)	(BWS)	NA	NA	NA	NA
O2 F-Factor, dscf/MMBtu	(Fd)	9680	9780	9784	9748
	CALCULATED DATA				
Nozzle Area, ft^2	(An)	3.46E-04	3.46E-04	3.46E-04	3.46E-04
Stack Area, ft^2	(As)	78.54	78.54	78.54	78.54
Stack Pressure, in. Hg	(Ps)	29.37	29.37	29.37	29.37
Meter Pressure, in. Hg	(Pm)	29.51	29.51	29.51	29.51
Standard Meter Volume, ft^3	(Vmstd)	36.880	37.134	37.581	37.198
Standard Water Volume, ft^3	(Vwstd)	7.484	7.465	7.418	7.456
Moisture Fraction (Measured)	(BWS)	0.169	0.167	0.165	0.167
Moisture Fraction (lower sat/meas)	(BWS)	0.169	0.167	0.165	0.167
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	29.79	29.91	29.99	29.90
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	27.80	27.91	28.02	27.91
Average Stack Gas Velocity, ft/sec	(Vs)	56.83	58.20	58.34	57.79
Stack Gas Flow, actual, ft^3/min	(Qa)	267786	274283	274942	272337
Stack Gas Flow, Std , ft^3/min	(Qs)	138302	139540	140599	139480
Isokinetic Sampling Rate, %	(%I)	100.8	100.6	101.0	100.8
Particulate Conc @ Std Cond, gr/ft^3	(Cs)	0.0555	0.0163	0.0189	0.0302
Particulate Emission, lb/hr	(PMR)	65.8	19.5	22.8	36.0
Particulate Emission Factor, lb/MMBtu	(Fd)	0.1707	0.0440	0.0481	0.0876
Calibration check	(Yqa)	1.0007	0.9987	0.9899	0.996
Percent difference from Y					-0.65%

CZ 8093

I so = 100.4
Moist = 16.9

ISOKINETIC FIELD DATA SHEET

Method 5

Page ____ of ____

Client	Bowater
W.O.#	
Project ID	Bowater-catawba
Mode/Source ID	#1 CB
Samp. Loc. ID	Stack
Run No.ID	1
Test Method ID	5
Date ID	7/17/06
Source/Location	
Sample Date	7/18/06
Baro. Press (in Hg)	29.41
Operator	MTF/BM

Stack Conditions	Assumed	Actual
% Moisture	16	
Impinger Vol (ml)		150
Silica gel (g)		9.0
CO2, % by Vol		
O2, % by Vol		
Temperature (°F)	388	
Meter Temp (°F)	100	
Static Press (in H_2O)	-.5	
Ambient Temp (°F)		

Meter Box ID	4015
Meter Box Y	1.005
Meter Box Del H	1.793
Probe ID / Length	PR7 / 5'
Probe Material	P4 / SS
Pitot / Thermocouple ID	P4
Pitot Coefficient	.84
Nozzle ID	
Avg Nozzle Dia (in)	.252
Area of Stack (ft²)	78.54
Sample Time	60
Total Traverse Pts	24

K Factor 2.14

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft³)	.018		0.010
Leak Check @ (in Hg)	12		12
Pitot good	yes / no	yes / no	yes / no
Orsat good	yes / no	yes / no	yes / no

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp		
Reference Temp		
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response ?	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	310			237.257									
A 1	2.5		.58	1.2	238.86	363	96		251	270	65	5	223	
2	5.0		.55	1.2	240.43	364	96		252	271	65	5	224	
3	7.5		.49	1.0	241.97	365	96		255	241	53	4	226	Fyrite:
4	10.0		.45	.96	243.29	366	96		254	244	52	4	230	O2 - 12
5	12.5		~~.39~~ .40	.86	244.62	365	97		254	239	50	3	231	CO2 - 6.5
6	15.0		.48	1.0	245.995	364	96		254	239	50	4	229	
B 1	17.5		.76	1.6	247.86	371	96		253	240	50	6	231	
2	20.0		.80	1.7	249.95	376	96		252	241	58	7	227	
3	22.5		.83	1.8	251.65	379	97		253	247	51	8	235	
4	25.0		.81	1.7	253.50	375	97		254	246	52	7	241	
5	27.5		.75	1.6	255.34	365	97		253	244	52	7	249	
6	30.0		.59	1.3	256.965	359	97		251	242	52	6	251	
C 1	32.5		.72	1.5	258.72	376	97		253	254	59	7	238	
2	35.0		.74	1.6	260.52	381	97		254	250	54	7	241	
3	37.5		.75	1.6	262.32	381	97		254	243	55	7	247	
4	40.0		.72	1.5	264.05	380	97		256	242	54	7	253	
~~42.5~~ 5	~~45.0~~	42.5	.64	1.4	265.72	380	97		254	243	54	6	255	
~~45~~ 6	~~47.5~~	45.0	.59 HF	1.3 HF	267.3	379	98		254	248	55	6	255	
D 47.5 ①	~~50.0~~	~~52.5~~	~~.65~~ .70	~~1.4~~ 1.5	269.11	381	98		255	249	56	7	254	
50.0 ②	~~52.5~~	~~55.0~~	.62	1.3	270.79	384	98		253	235	59	6	243	
52.5 ③	~~55.0~~	~~57~~	.55	1.2	272.31	384	99		251	257	60	6	246	
55.0 ④	~~57.5~~		.50	1.1	273.80	384	99		255	244	57	5	251	
57.5 ⑤			.45	.96	275.31	383	99		254	243	57		254	
60 ⑥	60.0	412	.43	.92	276.604	378	99		255	244	57		255	
			Avg Sqrt Delta P .7834	Avg Delta H 1.325	Total Volume 39.347	Avg Ts 374	Avg Tm 97		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	

Avg = .6208

Avg Sqrt Del H 1.1445

Comments:

WESTON MANAGERS DESIGNERS/CONSULTANTS

CZ 8094

ISOKINETIC FIELD DATA SHEET

Method 5

Page ____ of ____

		Stack Conditions	Assumed	Actual
Client	Bovatec			
W.O.#				
Project ID	Bovato - catawba	% Moisture	16	
Mode/Source ID	#1CB	Impinger Vol (ml)		150
Samp. Loc. ID	Stack	Silica gel (g)		8.6
Run No.ID	3	CO2, % by Vol	12.65	
Test Method ID	5	O2, % by Vol	12 6.5	
Date ID	7/17/06	Temperature (°F)	355	
Source/Location		Meter Temp (°F)	100	
Sample Date	7/18/06	Static Press (in H_2O)	-.5	
Baro. Press (in Hg)	29.41			
Operator	MTF/BM	Ambient Temp (°F)	95	

Meter Box ID	A015		
Meter Box Y	1.003		
Meter Box Del H	1.783	**Leak Checks**	
Probe ID / Length	P7 / 5'	Sample Train (ft^3)	.013
Probe Material	SS	Leak Check @ (in Hg)	14
Pitot / Thermocouple ID	P4	Pitot good	yes / no
Pitot Coefficient	.84	Orsat good	yes / no
Nozzle ID		**Temp Check**	
Avg Nozzle Dia (in)	.252	Meter Box Temp	
Area of Stack (ft^2)	78.54	Reference Temp	
Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail
Total Traverse Pts	24	Temp Change Response ?	yes / no

K Factor 2.14

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft^3)	.013		.012
Leak Check @ (in Hg)	14		10
Pitot good	yes / no	yes / no	yes / no
Orsat good	yes / no	yes / no	yes / no
	Pre-Test Set		Post-Test Set
Temp Change Response ?	Pass / Fail		Pass / Fail
	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1646			277.503									
A 1	2.5		.76	1.6	279.4	389	99		249	263	68	6	243	Imp 1 241 - 100 = 141
2	5.0		.69	1.5	281.3	390	99		251	258	65	6	237	2 106 - 100 = 6
3	7.5		.60	1.3	282.8	391	100		254	243	56	6	232	3 3 - 0 = 3
4	10.0		.54	1.1	284.3	391	100		253	243	55	5	238	gain 150
5	12.5		.48	1.0	285.7	391	101		253	245	55	4	240	
6	15.0		.42	.88	287.0	389	101		253	243	56	4	239	5.6 338.7
B 1	17.5		.71	1.5	288.7	387	101		252	242	62	6	225	- 330.1
2	20.0		.80	1.7	290.7	390	101		252	242	59	6	238	gain 8.6
3	22.5		.77	1.6	292.4	390	102		254	243	58	6	255	
4	25.0		.71	1.5	294.2	390	103		253	243	57	5	261	
5	27.5		.64	1.3	295.8	389	102		254	242	58	6	261	
6	30.0		.57	1.2	297.6	387	103		254	242	59	6	258	
C 1	32.5		.76	1.6	299.3	384	103		250	242	63	6	241	
2	35.0		.81	1.7	301.1	388	103		253	245	61	7	250	
3	37.5		.76	1.6	303.0	389	103		255	243	59	7	262	
4	40.0		.73	1.5	304.7	389	104		255	243	59	7	265	
5	42.5		.66	1.4	306.6	388	104		255	247	60	6	263	
6	45.0		.60	1.3	308.2	387	104		253	245	60	6	262	
D 1	47.5		.72	1.5	309.9	391	104		253	244	64	6	260	
2	50.0		.66	1.4	311.6	384	104		254	245	62	7	250	
3	52.5		.61	1.3	313.2	385	104		254	244	60	5	260	
4	55.0		.50	1.1	314.7	385	104		258	246	61	5	261	
5	57.5		.46	.97	316.1	385	106		253	242	61	4	258	
6	60.0	1752	.43	.90	317.510	384	105		253	243	60	4	260	
			Avg Sqrt Delta P .7972	Avg Delta H 1.352	Total Volume 40.007	Avg Ts 387.9	Avg Tm 102.5		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	

AVG. .641

Avg Sqrt Del H 1.158

Comments: 388

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C-3

CZ 8095

ISOKINETIC FIELD DATA SHEET

Method 5

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Client	Bowater
W.O.#	
Project ID	Bowater-Catawba
Mode/Source ID	#1 CB
Samp. Loc. ID	Stack
Run No.ID	2
Test Method ID	5
Date ID	7/17/06
Source/Location	
Sample Date	7/18/06
Baro. Press (in Hg)	29.41
Operator	MS/VSH ~~MFT TBM~~

Stack Conditions	Assumed	Actual
% Moisture	16	
Impinger Vol (ml)		146
Silica gel (g)		11.6
CO2, % by Vol		
O2, % by Vol		
Temperature (°F)	368	
Meter Temp (°F)	160	
Static Press (in H_2O)	-.5	
Ambient Temp (°F)	95	

Meter Box ID	A015
Meter Box Y	1.003
Meter Box Del H	1.783
Probe ID / Length	PR7 / 5'
Probe Material	SS
Pitot / Thermocouple ID	P41
Pitot Coefficient	.84
Nozzle ID	
Avg Nozzle Dia (in)	.252
Area of Stack (ft^2)	78.54
Sample Time	60
Total Traverse Pts	24

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft^3)	.007		.007
Leak Check @ (in Hg)	12		10
Pitot good	yes / no	yes / no	yes / no
Orsat good	yes / no	yes / no	yes / no

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp		
Reference Temp		
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response ?	yes / no	yes / no

K Factor 2.1

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1811			317.752									
P 1	2.5		.81	1.7	319.7	386	101		249	231	68	4	230	1 232
2	5.0		.68	1.4	322.0	387	101		254	232	66	5	229	2 108
3	7.5		.65	1.4	324.6	388	101		254	227	66	5	224	3 6
4	10.0		.57	1.2	325.1	389	102		255	230	63	5	229	
5	12.5		.47	.99	326.5	388	102		254	230	63	4	230	
6	15.0		.39	.82	327.8	386	102		254	229	64	3	229	
C 1	17.5		.85	1.8	329.9	379	101		251	228	66	7	224	
2	20.0		.84	1.8	331.6	389	101		253	250	62	7	236	344.5
3	22.5		.80	1.7	333.4	389	101		256	245	59	7	248	-332.9
4	25.0		.74	1.6	335.7	389	102		254	243	57	7	254	11.6
5	27.5		.66	1.4	337.1	387	102		254	240	57	6	254	
6	30.0		.63	1.3	338.6	386	102		254	242	56	6	253	
B 1	32.5		.78	1.6	340.3	381	102		244	245	65	6	236	
2	35.0		.78	1.6	342.2	387	102		250	244	61	6	245	
3	37.5		.77	1.6	344.4	388	103		254	242	60	7	258	
4	40.0		.73	1.5	345.8	388	103		253	246	61	7	263	
5	42.5		.67	1.4	347.5	387	104		253	247	62	6	262	
6	45.0		.56	1.2	349.2	386	104		254	241	62	6	260	
A 1	47.5		.67	1.4	350.7	381	103		252	243	65	6	230	
2	50.0		.66	1.4	352.7	387	104		250	240	65	6	249	
3	52.5		.55	1.2	354.0	387	104		252	244	63	5	253	
4	55.0		.50	1.1	355.6	388	103		252	243	63	5	261	
5	57.5		.44	.92	357.0	387	103		252	241	60	5	260	
6	60	1918	.39	.82	358.224	384	103		253	240	61	5	260	
			Avg Sqrt Delta P .8012	Avg Delta H 1.369	Total Volume 40.472	Avg Ts 386.2	Avg Tm 102.3		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	

132
8
6
146

~~Avg~~ .650	Avg Sqrt Del H 1.163

Comments:

WESTON MANAGERS DESIGNERS/CONSULTANTS

1 NA

RUN DATA

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 19:53				
19:53:45	4559	11.4	3392	8.3
19:54:15	4561	11.4	3396	8.3
19:54:45	4569	11.5	3387	8.3
19:55:15	4580	11.5	3380	8.2
19:55:45	4586	11.5	3375	8.2
Run Avg	**4571**	**11.5**	**3386**	**8.3**

RUN DATA

Number 2

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 19:56				
19:57:14	4029	10.1	3864	9.4
19:57:44	4026	10.1	3871	9.5
19:58:14	4026	10.1	3869	9.4
19:58:44	4026	10.1	3870	9.5
19:59:14	4026	10.1	3868	9.4
Run Avg	**4027**	**10.1**	**3868**	**9.4**

RUN DATA

Number 3

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 20:00				
20:00:34	3769	9.4	4122	10.1
20:01:04	3768	9.4	4121	10.1
20:01:34	3768	9.4	4123	10.1
20:02:04	3769	9.4	4124	10.1
20:02:34	3768	9.4	4126	10.1
Run Avg	**3768**	**9.4**	**4123**	**10.1**

CALIBRATION

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**

Starting Time: 19:51

O2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	95
10.1	CC92388	4025
20.4	SG880199NB	8078

Curve Coefficients

Slope	Intercept	Corr. Coeff.
391.3	87.8	>0.9999

CO2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	12
9.9	CC92388	4065
19.5	SG880199NB	7959

Curve Coefficients

Slope	Intercept	Corr. Coeff.
407.5	18.1	>0.9999

CALIBRATION ERROR

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**

Starting Time: 19:51

O2

Method: EPA 3A

Slope 391.3 **Intercept** 87.8

Standard, %	Response, mV	%	Error, %
Zero	95	0.0	0.0
10.10	4025	10.1	0.0
20.4	8078	20.4	0.0

CO2

Method: EPA 3A

Slope 407.5 **Intercept** 18.1

Standard, %	Response, mV	%	Error, %
Zero	12	0.0	0.0
9.90	4065	9.9	0.0
19.5	7959	19.5	0.0

ANALYZER INFORMATION

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 1 Comb. Boiler**	Date:	**18 Jul 2006**

File Name: C:\Data\Bowater- Catawba, SC\Compliance 2006\No. 1 CB bags.cem
Computer: WSAUB60 **Trailer:** 261

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	**O2**
Method	**EPA 3A**, Using Bias
Analyzer Make & Model	**CA 300**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.0**

Channel 2

Analyte	**CO2**
Method	**EPA 3A**, Using Bias
Analyzer Make & Model	**CA 300**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.0**

APPENDIX D
FIELD DATA – NO. 2 COMBINATION BOILER

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date		7/18/06	7/18/06	7/18/06	---
Time Began		949	1130	1315	---
Time Ended		1056	1237	1423	---
INPUT DATA					
Sampling Time, min	(Theta)	60	60	60	60
Stack Diameter, in.	(Dia.)	120.00	120.00	120.00	120.00
Barometric Pressure, in. Hg	(Pb)	29.41	29.41	29.41	29.41
Static Pressure, in. H2O	(Pg)	-1.10	-0.70	-0.70	-0.83
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	1.0030	1.0030	1.0030	1.0030
Orifice Calibration Value	(Delta H@)	1.7830	1.7830	1.7830	1.7830
Nozzle Diameter, in.	(Dn)	0.215	0.218	0.218	0.217
Meter Volume, ft^3	(Vm)	35.341	36.292	36.941	36.191
Meter Temperature, °F	(Tm)	92.3	95.4	98.0	95.2
Meter Temperature, °R	(Tm-R)	552.3	555.4	558.0	555.2
Meter Orifice Pressure, in. H2O	(Delta H)	1.104	1.142	1.175	1.140
Ave Sq Rt Orifice Press, (in. H2O)^½	((Delta H)½)avg)	1.047	1.065	1.081	1.064
Volume H2O Collected, mL	(Vlc)	153.5	118.6	144.1	138.7
CO2 Concentration, %	(CO2)	8.3	9.2	8.4	8.6
O2 Concentration, %	(O2)	11.5	10.5	11.4	11.1
Ave Sq Rt Velo Head, (in. H2O)^½	((Delta P)½)avg)	0.955	0.975	0.992	0.974
Stack Temperature, °F	(Ts)	408.0	415.8	420.3	414.7
Stack Temperature, °R	(Ts-R)	868.0	875.8	880.3	874.7
Particulate Collected, g	(Mn)	0.0723	0.0656	0.0836	0.0738
Moisture Fraction (at Saturation)	(BWS)	NA	NA	NA	NA
O2 F-Factor, dscf/MMBtu	(Fd)	9737	9737	9741	9738
CALCULATED DATA					
Nozzle Area, ft^2	(An)	2.52E-04	2.59E-04	2.59E-04	2.57E-04
Stack Area, ft^2	(As)	78.54	78.54	78.54	78.54
Stack Pressure, in. Hg	(Ps)	29.33	29.36	29.36	29.35
Meter Pressure, in. Hg	(Pm)	29.49	29.49	29.50	29.49
Standard Meter Volume, ft^3	(Vmstd)	33.388	34.099	34.550	34.012
Standard Water Volume, ft^3	(Vwstd)	7.225	5.583	6.783	6.530
Moisture Fraction (Measured)	(BWS)	0.178	0.141	0.164	0.161
Moisture Fraction (lower sat/meas)	(BWS)	0.178	0.141	0.164	0.161
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	29.79	29.89	29.80	29.83
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	27.69	28.22	27.86	27.92
Average Stack Gas Velocity, ft/sec	(Vs)	70.91	71.95	73.88	72.25
Stack Gas Flow, actual, ft^3/min	(Qa)	334138	339064	348169	340457
Stack Gas Flow, Std , ft^3/min	(Qs)	163730	172291	171216	169079
Isokinetic Sampling Rate, %	(%I)	105.9	100.0	101.9	102.6
Particulate Conc @ Std Cond, gr/ft^3	(Cs)	0.0334	0.0297	0.0373	0.0335
Particulate Emission, lb/hr	(PMR)	46.9	43.8	54.8	48.5
Particulate Emission Factor, lb/MMBtu	(Fd)	0.1033	0.0830	0.1143	0.1002
Calibration check	(Yqa)	1.0152	1.0062	1.0079	1.010
Percent difference from Y					0.68%

CZ8090 ~~CZ8088~~

ISO = 103
moist = 17.8

ISOKINETIC FIELD DATA SHEET

Method 5

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		Stack Conditions	Assumed	Actual
Client	Bowater	% Moisture	12	
W.O.#		Impinger Vol (ml)		
Project ID	Bowater - Catawba	Silica gel (g)		
Mode/Source ID	#2 CB	CO2, % by Vol	6.5	
Samp. Loc. ID	stack	O2, % by Vol	14	
Run No.ID	1	Temperature (°F)	420	
Test Method ID	5	Meter Temp (°F)	100	
Date ID	~~6/17/06~~	Static Press (in H_2O)	-1.1	
Source/Location		Ambient Temp (°F)	80	
Sample Date	6/18/06			
Baro. Press (in Hg)	29.41			
Operator	MTF / JH			

Meter Box ID	A015	
Meter Box Y	1.003	
Meter Box Del H	1.783	
Probe ID / Length	PR7	5'
Probe Material	SS	
Pitot / Thermocouple ID	PH	
Pitot Coefficient	.84	
Nozzle ID		
Avg Nozzle Dia (in)	.215	
Area of Stack (ft²)	78.54	
Sample Time	60	
Total Traverse Pts	24	

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft³)	.017		.017
Leak Check @ (in Hg)	10		9
Pitot good	(yes) / no	yes / no	(yes) / no
Orsat good	(yes) / no	yes / no	(yes) / no

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp		
Reference Temp		
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response ?	yes / no	yes / no

K Factor 1.2

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	9:49			125.901									
A 1	2.5		1.1	1.3	127.48	406	90		251	266	66	6	283	
2	5.0		1.0	1.2	129.00	406	90		254	265	65	5	251	
3	7.5		.91	1.1	130.46	405	90		257	257	62	5	258	Fyrite:
4	10		.88	1.1	131.94	405	90		254	252	59	5	265	
5	12.5		.83	1.0	133.32	402	90		255	252	55	5	265	
6	15		.72	.86	134.646	403	91		254	249	54	4	261	
B 1	17.5		1.0	1.2	136.17	405	91		252	264	58	6	267	O_2 13%
2	20		1.0	1.2	137.69	408	91		254	259	57	6	245	
3	22.5		.98	1.2	139.23	408	92		258	252	55	6	267	CO2 8%
4	25		.97	1.2	140.76	409	93		257	251	54	6	268	
5	27.5		.92	1.1	142.28	409	92		256	249	55	6	270	
6	30		.80	.96	143.648	406	93		251	248	56	5	268	
C 1	32.5		1.1	1.3	145.23	408	93		251	263	61	6	260	
2	35		1.1	1.3	143.83	410	93		251	252	59	6	257	
3	37.5		1.1	1.3	148.44	411	93		252	247	59	7	262	
4	40		1.1	1.3	150.03	411	93		253	251	58	7	270	
5	42.5		.98	1.2	151.55	411	93		251	248	58	6	270	
6	45		.87	1.0	152.975	406	93		251	245	59	6	268	
D 1	47.5		1.0	1.2	154.54	410	94		252	251	59	6	263	
2	50		.96	1.2	156.08	413	93		250	251	63	6	246	
3	52.5		.85	1.0	157.52	412	94		255	248	60	6	264	
4	55		.75	.90	158.88	410	94		255	249	61	5	265	
5	57.5		.64	.77	160.14	404	95		254	247	60	5	262	
6	60	1056	.50	.60	161.242	405	95		255	249	60	6	263	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.9551	~~1.079~~	35.341	408	92.3						270	

WESTON MANAGERS DESIGNERS/CONSULTANTS

Avg = .9192

Avg Sqrt Del H ~~1.0485~~ 1.104 1.047

Comments: 407.6

D-2

CZ8091

Iso = 99.8
Moist. = 13.8

ISOKINETIC FIELD DATA SHEET

Method 5

Page ____ of ____

Client	Bowater
W.O.#	
Project ID	Bowater - catawba
Mode/Source ID	#2 CB
Samp. Loc. ID	Stack
Run No.ID	2
Test Method ID	5
Date ID	~~7/17/06~~
Source/Location	
Sample Date	7/18/06
Baro. Press (in Hg)	29.41
Operator	MTF / DM

Stack Conditions	Assumed	Actual
% Moisture	12	
Impinger Vol (ml)		
Silica gel (g)		
CO2, % by Vol	13	
O2, % by Vol	8	
Temperature (°F)	4	
Meter Temp (°F)	100	
Static Press (in H_2O)	-.7	
Ambient Temp (°F)	90	

Meter Box ID	A015
Meter Box Y	1.003
Meter Box Del H	1.782
Probe ID / Length	PR7 / 5'
Probe Material	SS
Pitot / Thermocouple ID	P4
Pitot Coefficient	.84
Nozzle ID	
Avg Nozzle Dia (in)	.218
Area of Stack (ft²)	78.54
Sample Time	60
Total Traverse Pts	24

K Factor 1.2

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft³)	.01		.005
Leak Check @ (in Hg)	12		9
Pitot good	yes / no	yes / no	yes / no
Orsat good	yes / no	yes / no	yes / no
Temp Check	Pre-Test Set		Post-Test Set
Meter Box Temp			
Reference Temp			
Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Temp Change Response ?	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1130			162.249									
D 1	2.5		1.1	1.3	163.84	407	91		250	257	63	5	225	
2	5.0		.99	1.2	165.40	416	92		251	252	63	5	227	
3	7.5		.86	1.0	166.80	416	93		254	245	59	5	228	Fyrite:
4	10.0		.80	.96	168.22	414	93		255	248	55	5	227	
5	12.5		.66	.80	169.50	406	94		256	248	54	5	229	O2 = 12.5
6	15.0		.53	.64	170.667	407	94		253	249	53	3	234	CO2 = 8.5
C 1	17.5		1.2	1.4	172.32	416	94		256	248	58	6	234	
2	20.0		1.1	1.3	173.92	417	94		250	244	56	6	232	
3	22.5		1.1	1.3	175.24	418	94		251	250	55	6	242	
4	25.0		1.1	1.3	177.11	419	95		252	252	55	6	255	
5	27.5		1.0	1.2	178.67	418	95		252	247	54	5	262	
6	30.0		.94	1.1	180.153	411	95		252	229	54	5	262	
B 1	32.5		1.0	1.2	181.72	414	96		251	237	55	5	259	
2	35.0		1.0	1.2	183.26	420	96		250	262	57	5	238	
3	37.5		1.1	1.3	184.84	420	96		254	248	57	6	252	
4	40.0		1.0	1.2	186.40	420	97		254	228	56	6	262	
5	42.5		1.0	1.2	188.02	420	97		256	230	56	7	267	
6	45.0		.94	1.1	189.682	417	97		251	232	56	6	266	
A 1	47.5		1.1	1.3	191.10	417	98		251	242	56	7	263	
2	50.0		1.1	1.3	192.67	418	97		249	259	58	7	252	
3	52.5		.96	1.2	194.24	418	97		252	254	57	7	256	
4	55.0		.89	1.1	195.78	419	98		255	253	56	7	268	
5	57.5		.80	.96	197.20	417	98		254	252	56	5	262	
6	60.0	1237	.70	.84	198.541	415	99		255	254	58	5	263	
			Avg Sqrt Delta P .9745	Avg Delta H 1.142	Total Volume 36.292	Avg Ts 415.8			Avg Tm 95.4	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp

WESTON MANAGERS DESIGNERS/CONSULTANTS

Avg = .9571

Avg Sqrt Del H 1.0646

Comments:

TS

CZ8092 Iso = 102
moist = 16.4

ISOKINETIC FIELD DATA SHEET

Method 5

Page ____ of ____

		Stack Conditions	Assumed	Actual
Client	Bowater	% Moisture	17.7	
W.O.#		Impinger Vol (ml)		
Project ID	Bowater - Catawba	Silica gel (g)		
Mode/Source ID	#2 RB	CO2, % by Vol	13.8	
Samp. Loc. ID	Stack	O2, % by Vol	13	
Run No.ID	3	Temperature (°F)	412	
Test Method ID	5	Meter Temp (°F)	100	
Date ID	7/17/06	Static Press (in H_2O)	-.7	
Source/Location		Ambient Temp (°F)	90	
Sample Date	7/18/06			
Baro. Press (in Hg)	29.41			
Operator	MTE/BM			

Meter Box ID	A015		
Meter Box Y	1.003		
Meter Box Del H	1.783		
Probe ID / Length	PR7	5'	
Probe Material	SS		
Pitot / Thermocouple ID	P4		
Pitot Coefficient	.84		
Nozzle ID			
Avg Nozzle Dia (in)	.218		
Area of Stack (ft^2)	78.54		
Sample Time	60		
Total Traverse Pts	24		

K Factor 1.2

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft^3)	.015		.014
Leak Check @ (in Hg)	12		9
Pitot good	yes / no	yes / no	yes / no
Orsat good	yes / no	yes / no	yes / no

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp		
Reference Temp		
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response ?	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	115			199.709									
A 1	2.5		1.1	1.3	~~210.34~~ 201.34	~~95~~ 412	~~95~~ 52		252	262	63	5	225	
2	5.0		1.1	1.3	202.98	416	96		250	270	60	5	227	
3	7.5		1.0	1.2	204.84	417	96		252	259	55	5	227	
4	10.0		.92	1.1	206.03	418	96		253	242	53	5	229	Finite
5	12.5		.86	1.0	207.53	416	97		253	244	50	4	227	O2 = 13
6	15.0		.82	.98	208.954	415	97		253	245	51	4	230	CO2 = 8.8
B 1	17.5		1.1	1.3	210.56	419	98		254	242	54	5	240	
2	20.0		1.1	1.3	212.15	421	97		251	259	57	5	223	
3	22.5		1.1	1.3	213.75	422	97		256	251	54	5	231	
4	25.0		1.1	1.3	215.35	423	97		254	240	54	5	240	
5	27.5		1.0	1.2	216.92	424	98		253	246	53	5	245	
6	30.0		.90	1.1	218.428	419	98		256	254	54	5	250	
C 1	32.5		1.1	1.3	220.00	422	98		249	254	54	5	251	
2	35.0		1.1	1.3	221.55	425	98		252	246	59	5	239	
3	37.5		1.1	1.3	223.38	423	98		255	247	56	6	245	
4	40.0		1.1	1.3	224.77	424	99		255	240	55	6	250	
5	42.5		1.0	1.2	226.27	422	98		251	239	55	6	252	
6	45.0		.93	1.1	227.786	418	99		253	246	56	5	253	
D 1	47.5		1.1	1.3	229.54	420	99		254	247	56	6	253	
2	50.0		1.0	1.2	230.98	424	99		252	244	63	6	231	
3	52.5		1.0	1.2	232.54	424	100		252	241	58	6	246	
4	55.0		.93	1.1	234.08	423	100		254	244	57	6	249	
5	57.5		.72	.86	235.44	421	101		253	245	58	6	251	
6	60	223	.56	.67	236.645	418	101		252	243	59	5	252	
			Avg Sqrt Delta P .9918	Avg Delta H 1.1754	Total Volume 36.941	Avg Ts 420.3	Avg Tm 98.0		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	

WESTON MANAGERS DESIGNERS/CONSULTANTS

Avg .9892

Avg Sqrt Del H 1.0813

Comments:

V-15

RUN DATA

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 15:59				
16:00:23	4590	11.5	3374	8.2
16:00:53	4582	11.5	3383	8.3
16:01:23	4584	11.5	3383	8.3
16:01:53	4595	11.5	3375	8.2
16:02:23	4612	11.6	3357	8.2
16:02:53	4610	11.6	3356	8.2
16:03:23	4580	11.5	3385	8.3
16:03:53	4581	11.5	3383	8.3
Run Avg	**4592**	**11.5**	**3375**	**8.3**

RUN DATA

Number 2

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 16:05				
16:06:18	4200	10.5	3750	9.2
16:06:48	4199	10.5	3755	9.2
16:07:18	4197	10.5	3755	9.2
16:07:48	4198	10.5	3759	9.2
16:08:18	4197	10.5	3760	9.2
16:08:48	4198	10.5	3760	9.2
16:09:18	4198	10.5	3760	9.2
16:09:48	4198	10.5	3760	9.2
Run Avg	**4198**	**10.5**	**3757**	**9.2**

RUN DATA

Number 3

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**
Calibration:	**1**		

Time	O2		CO2	
	mv	%	mv	%
Starting time 16:11				
16:11:41	4527	11.3	3442	8.4
16:12:11	4528	11.3	3438	8.4
16:12:41	4529	11.3	3439	8.4
16:13:11	4529	11.3	3439	8.4
16:13:41	4530	11.4	3435	8.4
16:14:11	4530	11.4	3433	8.4
16:14:41	4532	11.4	3433	8.4
16:15:11	4531	11.4	3433	8.4
Run Avg	**4530**	**11.4**	**3437**	**8.4**

CALIBRATION

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**

Starting Time: 15:52

O2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	95
10.1	CC92388	4025
20.4	SG880199NB	8078

Curve Coefficients

Slope	Intercept	Corr. Coeff.
391.3 ✓	87.8 ✓	>0.9999 ✓

CO2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	12
9.9	CC92388	4065
19.5	SG880199NB	7959

Curve Coefficients

Slope	Intercept	Corr. Coeff.
407.5 ✓	18.1 ✓	>0.9999 ✓

CALIBRATION ERROR

Number 1

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**

Starting Time: 15:52

O2

Method: EPA 3A

Slope 391.3 **Intercept** 87.8

Standard, %	**Response, mV**	**%**	**Error, %**
Zero	95	0.0	0.0
10.10	4025	10.1	0.0
20.4	8078	20.4	0.0

CO2

Method: EPA 3A

Slope 407.5 **Intercept** 18.1

Standard, %	**Response, mV**	**%**	**Error, %**
Zero	12	0.0	0.0
9.90	4065	9.9	0.0
19.5	7959	19.5	0.0

ANALYZER INFORMATION

Client:	**Bowater**	Project Number:	**03917.008.007**
Location:	**Catawba, SC**	Operator:	**T. Simpkins**
Source:	**No. 2 Comb. Boiler**	Date:	**18 Jul 2006**

File Name: C:\Data\Bowater- Catawba, SC\Compliance 2006\No. 2 CB bags.cem
Computer: WSAUB60 **Trailer:** 261

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	**O2**
Method	**EPA 3A**, Using Bias
Analyzer Make & Model	**CA 300**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.0**

Channel 2

Analyte	**CO2**
Method	**EPA 3A**, Using Bias
Analyzer Make & Model	**CA 300**
Full-Scale Output, mv	**10000**
Span Concentration, %	**25.0**

APPENDIX E
LABORATORY DATA

Inter-Office Memorandum

WESTON SOLUTIONS
Restoring Resource Efficiency

Auburn Operations

TO: Temp Simpkins cc: file

FROM: Brian Benson BSB DATE: 27 July 2006

PROJECT: Bowater – Catawba, SC

W.O.NO: 03917.008.007

SUBJECT: Method 5 Analysis Results.

ACTION: Analysis of samples received on 21 July 2006.

This letter with attachments constitutes our report of gravimetric determination of the glass fiber filters, acetone and water rinse fractions submitted to the laboratory for particulate analysis. The samples arrived in good condition and in accordance with the chain-of-custody. The samples were prepared on 21 July 2006 and analyzed on 24 July 2006 through 26 July 2006. The analysis followed procedures in USEPA Reference Method 5 for particulate emissions from stationary sources.

QUALITY ASSURANCE AND QUALITY CONTROL:

Quality control procedures conformed to the requirements of the reference method and our laboratory quality assurance program. Duplicate filter weights differed less than 0.5 mg or 1% of the total weight less the tare weight, whichever is greater. The water rinse fraction blank residue correction was equal to 0.001% of the total mass of the wash solvent used; therefore the water rinse fractions are blank corrected per EPA method 5. The acetone wash fraction blank residue correction was less than 0.001% of the total mass of the wash solvent used; therefore the acetone rinse fractions are blank corrected per EPA method 5. Filter residue weights were not blank corrected.

Substantiating data is on file and available upon request.

tal

attachments

Analysis Report

for Particulates by EPA Method 5

CLIENT	: Bowater - Catawba, SC	Balance ID:	Mettler AE163
WESTON W.O. No.	: 03917.008.007	Density of Acetone (g/mL):	0.791
Date Received	: 21 July 2006	Lab Ambient Temp (F):	73
Analyst	: STH	Lab Rel Humidity (%):	54
		Barometric Pressure (Hg):	31.08

Source	**# 2 Combination Boiler**			
Field Run No.	**ONE**	**TWO**	**THREE**	**FIELD BLANK**
LIQUID FRACTION				
Filter ID	CZ 8090	CZ 8091	CZ 8092	CZ 8088
Beaker ID	28-07	29-07	30-07	27-07
Liquid Volume (mL)	75	92	95	93
Constant Initial Weight (g)	**110.5040**	**125.7939**	**108.4879**	**132.5502**
Constant Final Weight (g)	**110.5161**	**125.8086**	**108.5098**	**132.5504**
Final-Initial Beaker Wts. (g)	0.0121	0.0148	0.0219	0.0002
Sample/Blank Volume Ratio	0.8065	0.9892	1.0215	
Liquid Blank Correction, ≤ 0.001% (g)	0.0002	0.0002	0.0003	
Liquid Blank Correction, > 0.001% (g)*	0.0006	0.0007	0.0008	
Liquid Particulate Weight (g)	**0.0118**	**0.0145**	**0.0216**	**0.0002**
FILTER FRACTION				
Filter ID	CZ 8090	CZ 8091	CZ 8092	CZ 8088
Constant Initial Weight (g)	**35.2755**	**35.7899**	**34.2218**	**32.7580**
Constant Final Weight (g)	**35.3359**	**35.8409**	**34.2837**	**32.7573**
Final-Initial Filter Wts. (g)	0.0604	0.0510	0.0619	-0.0007
Filter Blank (g)	-0.0007	-0.0007	-0.0007	
Filter Particulate Weight (g)	**0.0604**	**0.0510**	**0.0619**	
SUMMARY				
Filter Particulate Weight (g)	**0.0604**	**0.0510**	**0.0619**	
Liquid Particulate Weight (g)	**0.0118**	**0.0145**	**0.0216**	
Net Particulate Weight (g)	**0.0723**	**0.0656**	**0.0836**	

Values are rounded for presentation purposes only, thus values shown may differ from actual calculations.

Sample Recovery Solution **Acetone**

Weight Percent of Blank Liquid Fraction **0.0003%**

***Note: If the blank liquid fraction has a residue correction of greater than 0.001 percent, then the samples are blank corrected upto 0.001 % of the mass of the wash solvent.**

Analysis Report

for Particulates by EPA Method 5

CLIENT : Bowater - Catawba, SC
WESTON W.O. No. : 03917.008.007
Date Received : 21 July 2006
Analyst : STH

Balance ID: Mettler AE163
Density of Acetone (g/mL): 0.791
Lab Ambient Temp (F): 73
Lab Rel Humidity (%): 54
Barometric Pressure (Hg): 31.08

Source	# 1 Combination Boiler			
Field Run No.	**ONE**	**TWO**	**THREE**	**FIELD BLANK**
LIQUID FRACTION				
Filter ID	CZ 8093	CZ 8094	CZ 8095	CZ 8088
Beaker ID	31-07	32-07	33-07	27-07
Liquid Volume (mL)	95	72	110	93
Constant Initial Weight (g)	**115.8510**	**116.4725**	**112.5202**	**132.5502**
Constant Final Weight (g)	**115.8666**	**116.4779**	**112.5331**	**132.5504**
Final-Initial Beaker Wts. (g)	0.0155	0.0053	0.0129	0.0002
Sample/Blank Volume Ratio	1.0215	0.7742	1.1828	
Liquid Blank Correction, ≤ 0.001% (g)	0.0003	0.0002	0.0003	
Liquid Blank Correction, > 0.001% (g)*	0.0008	0.0006	0.0009	
Liquid Particulate Weight (g)	**0.0153**	**0.0052**	**0.0127**	**0.0002**
FILTER FRACTION				
Filter ID	CZ 8093	CZ 8094	CZ 8095	CZ 8088
Constant Initial Weight (g)	**31.2792**	**36.6561**	**35.0483**	**32.7580**
Constant Final Weight (g)	**31.3966**	**36.6901**	**35.0816**	**32.7573**
Final-Initial Filter Wts. (g)	0.1174	0.0339	0.0333	-0.0007
Filter Blank (g)	-0.0007	-0.0007	-0.0007	
Filter Particulate Weight (g)	**0.1174**	**0.0339**	**0.0333**	
SUMMARY				
Filter Particulate Weight (g)	**0.1174**	**0.0339**	**0.0333**	
Liquid Particulate Weight (g)	**0.0153**	**0.0052**	**0.0127**	
Net Particulate Weight (g)	**0.1327**	**0.0392**	**0.0461**	

Values are rounded for presentation purposes only, thus values shown may differ from actual calculations.

Sample Recovery Solution **Acetone**
Weight Percent of Blank **0.0003%**
Liquid Fraction

***Note: If the blank liquid fraction has a residue correction of greater than 0.001 percent, then the samples are blank corrected upto 0.001 % of the mass of the wash solvent.**

Analysis Report

for Particulates by EPA Method 5

CLIENT	: Bowater - Catawba, SC	Balance ID:	Mettler AE163
WESTON W.O. No.	: 03917.008.007	Density of Acetone (g/mL):	0.791
Date Received	: 21 July 2006	Lab Ambient Temp (F):	73
Analyst	: STH	Lab Rel Humidity (%):	54
		Barometric Pressure (Hg):	31.08

Source	**# 2 Recovery**			
Field Run No.	**ONE**	**TWO**	**THREE**	**FIELD BLANK**
LIQUID FRACTION				
Filter ID	CZ 8097	CZ 8098	CZ 7689	CZ 8088
Beaker ID	34-07	35-07	36-07	26-07
Liquid Volume (mL)	105	68	72	94
Constant Initial Weight (g)	**111.5379**	**112.4437**	**110.7467**	**113.6632**
Constant Final Weight (g)	**111.5541**	**112.4547**	**110.7553**	**113.6623**
Final-Initial Beaker Wts. (g)	0.0162	0.0111	0.0086	-0.0009
Sample/Blank Volume Ratio	1.1170	0.7234	0.7660	
Liquid Blank Correction, ≤ 0.001% (g)	-0.0010	-0.0007	-0.0007	
Liquid Blank Correction, > 0.001% (g)*	-0.0011	-0.0007	-0.0007	
Liquid Particulate Weight (g)	**0.0172**	**0.0117**	**0.0093**	**-0.0009**
FILTER FRACTION				
Filter ID	CZ 8097	CZ 8098	CZ 7689	CZ 8088
Constant Initial Weight (g)	**33.6852**	**36.7872**	**40.0125**	**32.7580**
Constant Final Weight (g)	**33.6847**	**36.7889**	**40.0114**	**32.7573**
Final-Initial Filter Wts. (g)	-0.0005	0.0018	-0.0012	-0.0007
Filter Blank (g)	-0.0007	-0.0007	-0.0007	
Filter Particulate Weight (g)	**-0.0005**	**0.0018**	**-0.0012**	
SUMMARY				
Filter Particulate Weight (g)	**-0.0005**	**0.0018**	**-0.0012**	
Liquid Particulate Weight (g)	**0.0172**	**0.0117**	**0.0093**	
Net Particulate Weight (g)	**0.0172**	**0.0135**	**0.0093**	

Negative values are not included in the Net Particulate Weight.

Values are rounded for presentation purposes only, thus values shown may differ from actual calculations.

Sample Recovery Solution **Water**

Weight Percent of Blank **0.0010%**

Liquid Fraction

***Note: If the blank liquid fraction has a residue correction of greater than 0.001 percent, then the samples are blank corrected upto 0.001 % of the mass of the wash solvent.**

Custody Transfer Record / Lab Service Request

Page__of__

Client: Bowater Catawba, S.C.

Work Order No.: 03917.008.007

Desired TAT: 3 days Results Due By: ASAP

Project Manager: Simpkins

Submitted By: Phone #:

ANALYSES REQUESTED: gravimetric

ANALYTICAL METHOD: EPA 5

Weston Use Only LAB ID	Client ID/ Sample Description	Matrix	Date Collected	gravimetric				Baker #	Volume mL		
	CZ 8088 Blank flt/ACE/DI	flt/ACE/DI	7-18-06				Acetone / DI H2O	27 07 / 26 07	93 / 94		
	CZ 8090 #2 Comb. Boiler Run 1 flt/FHR	flt/ACE	7/18/06					28 07	75		
	CZ 8091 #2 Comb. Boiler Run 2 flt/FHR	flt/ACE	7/18/06					29 07	92		
	CZ 8092 #2 Comb. Boiler Run 3 flt/FHR	flt/ACE	7/18/06					30 07	95		
	CZ 8093 #1 Comb. Boiler Run 1 flt/fhr	flt/ACE	7-18-06					31 07	95		
	CZ 8094 #1 Comb. Boiler Run 2 flt/fhr	flt/ACE	7-18-06					32 07	72		
	CZ 8095 #1 Comb Boiler Run 3 flt/fhr	flt/ACE	7-18-06					33 07	110		
	CZ 8097 No. 2 Recovery Run 1 flt/fHR	flt/H2O	7-20-06					34 07	105		
	CZ 8098 No. 2 Recovery Run 2 flt/fHR	flt/H2O	↓					35 07	68		
	CZ 7689 No. 2 Recovery Run 3 flt/fHR	flt/H2O	↓					36 07	72		
	TOTAL LISTED ON THIS COC										

RELINQUISHED BY	RECEIVED BY	DATE/TIME	# / CONDITION	RELINQUISHED BY	RECEIVED BY	DATE/TIME	# / CONDITION
MF	Carmen Carlton	7/21/06 / 1500	10 / good				

WESTON Analytics Use Only

SAMPLES WERE: Shipped on Blue Ice / Ambient or Chilled / Intact or Damaged

SECURITY SEALS WERE: Present or Absent / Intact or Broken or N/A

SAMPLE LOSS: Y or N

COC ACCURATE: Y or N

NOTE SAMPLE ID ON BACK

WESTON

APPENDIX F
QUALITY CONTROL DATA

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 12/29/05

METER PART #: AO15

METER SERIAL #: 97306

CRITICAL ORIFICE SET SERIAL #: 13315

BAROMETRIC PRESSURE (in Hg): INITIAL 29.10 | FINAL 29.05 | AVG (P_{bar}) 29.08

Calibrated by:

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	AMBIENT F°	DGM F° INITIAL	DGM F° FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	(4) $\Delta H_@$
12	1	0.3359	24	617.424	633.384	15.960	70	66	67	67	37	0.54	15.578	15.701	1.008	1.687
16	2	0.4418	22	776.741	793.985	17.244	71	72	71	72	30	0.99	16.691	16.728	1.002	1.791
19	3	0.5188	21	745.349	770.460	25.111	71	72	72	72	37	1.40	24.309	24.227	0.997	1.837
25	4	0.6885	19	711.547	738.250	26.703	71	72	73	73	30	2.40	25.890	26.069	1.007	1.788
31	5	0.8376	17	686.904	698.838	11.934	71	72	72	72	11	3.60	11.617	11.629	1.001	1.812
														AVG =	**1.003**	**1.783**

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

Individual Y's .02 from average? YES

Individual $\Delta H_@$ values 0.2 from average? YES

(1) $V_m \text{ (std)} = K_1 V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr} \text{ (std)} = K' \sqrt{\dfrac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \dfrac{V_{cr} \text{ (std)}}{V_m \text{ (std)}}$ = DGM calibration factor

(4) $\Delta H_@ = \left(\dfrac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H$

Bowater
Catawba, South Carolina

03917.008.007
No. 1 Combination Boiler

POST-TEST METER Y CALIBRATION CHECK

Meter ID:

Run Number		1	2	3	Mean
Sampling Time, min	(Theta)	60	60	60	60
Meter Volume, ft^3	(Vm)	39.347	40.007	40.472	39.942
Meter Temperature, R	(tm)	557	563	562	561
Barometric Pressure, in. Hg	(Pb)	29.41	29.41	29.41	29.41
Meter Orifice Pressure, in. H_2O	(dH)	1.325	1.352	1.369	1.349
Meter Pressure, in. Hg	(Pm)	29.51	29.51	29.51	29.51
Ave Sq Rt Meter Orifice Pressure, in. H_2O	((sqrt. dH)ave	1.145	1.158	1.163	1.155
Meter Orifice Calibraion Coefficient, in. H_2O	(dH@)	1.783	1.783	1.783	1.783
Dry Mol. Wt. of Stack Gas, lb/lb-mole	(Md)	29.79	29.91	29.99	29.90
Dry Gas Meter Cal. Check Value	(Yqa)	1.0007	0.9987	0.9899	0.9964
Meter Correction Factor	(Y)	1.0030	1.0030	1.0030	1.0030
Mean Percent Difference, %	< +/- 5%				**-0.65**

Bowater
Catawba, South Carolina

03917.008.007
No. 2 Combination Boiler

POST-TEST METER Y CALIBRATION CHECK

Meter ID:

Run Number		1	2	3	Mean
Sampling Time, min	(Theta)	60	60	60	60
Meter Volume, ft^3	(Vm)	35.341	36.292	36.941	36.191
Meter Temperature, R	(tm)	552	555	558	555
Barometric Pressure, in. Hg	(Pb)	29.41	29.41	29.41	29.41
Meter Orifice Pressure, in. H_2O	(dH)	1.104	1.142	1.175	1.140
Meter Pressure, in. Hg	(Pm)	29.49	29.49	29.50	29.49
Ave Sq Rt Meter Orifice Pressure, in. H_2O	((sqrt. dH)ave	1.047	1.065	1.081	1.064
Meter Orifice Calibraion Coefficient, in. H_2O	(dH@)	1.783	1.783	1.783	1.783
Dry Mol. Wt. of Stack Gas, lb/lb-mole	(Md)	29.79	29.89	29.80	29.83
Dry Gas Meter Cal. Check Value	(Yqa)	1.0152	1.0062	1.0079	1.0098
Meter Correction Factor	(Y)	1.0030	1.0030	1.0030	1.0030
Mean Percent Difference, %	< +/- 5%				**0.68**

Airgas

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900 Fax: 225.388.0959
www.airgas.com

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number:	CC92388	Reference Number:	83-124064666-1
Cylinder Pressure:	2000.6 PSIG	Expiration Date:	5/10/2009
Certification Date:	5/10/2006	Laboratory:	ASG - Port Allen - LA

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON DIOXIDE	9.943 %	+/- 1%	NonDispersive Infrared	G1
OXYGEN	10.05 %	+/- 1%	Paramagnetic	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 82658	NITROGEN	OXYGEN	CC14336	9.72 %
NTRM 81674	NITROGEN	CARBON DIOXIDE	XC018732B	6.89 %

Analytical Results

1st Component CARBON DIOXIDE

1st Analysis Date: 05/11/2006

R 7.04	S 10.16	Z 0.02	Conc 9.943 %
S 10.16	Z 0.02	R 7.06	Conc 9.943 %
Z 0.02	R 7.04	S 10.16	Conc 9.943 %
			AVG: 9.943 %

2nd Component OXYGEN

1st Analysis Date: 05/10/2006

R 9.68	S 10.02	Z -0.02	Conc 10.06 %
S 10.00	Z -0.02	R 9.68	Conc 10.04 %
Z -0.02	R 9.68	S 10.00	Conc 10.04 %
			AVG: 10.05 %

Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
www.airgas.com

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number:	SG880199NB	Reference Number:	54-124028233-8
Cylinder Pressure:	1999.6 PSIG	Expiration Date:	1/20/2008
Certification Date:	1/20/2005	Laboratory:	ASG - Chicago - IL

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON DIOXIDE	19.48 %	+/- 1%	NDIR	G1
OXYGEN	20.40 %	+/- 1%	Paramagnetic	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 100504		OXYGEN	SG9168314BAL	20.98 %
ntrm 040604		CARBON DIOXIDE	xco343190	19.84 %

Analytical Results

1st Component CARBON DIOXIDE

1st Analysis Date: 01/20/2005

R 19.83	S 19.46	Z 0	Conc 19.47 %
S 19.47	Z 0	R 19.83	Conc 19.48 %
Z 0	R 19.82	S 19.46	Conc 19.48 %
			AVG: 19.48 %

2nd Component OXYGEN

1st Analysis Date: 01/20/2005

R 20.98	S 20.40	Z 0	Conc 20.40 %
S 20.41	Z 0	R 20.99	Conc 20.40 %
Z 0	R 20.99	S 20.41	Conc 20.40 %
			AVG: 20.40 %

APPENDIX G
PROCESS OPERATING/PRODUCTION DATA

No. 1 Combination Boiler – F-Factor Calculation

Bark	9600	M-19
Oil	9190	M-19
Gas	8710	M-19
TDF	15,500	mill supplied

Run 1	Run 2	Run 3
(9600 × .65)	(9600 × .67)	(9600 × .68)
(9190 × .29)	(9190 × .28)	(9190 × .27)
+ (15,500 × .05)	+ (15,500 × .05)	+ (15,500 × .05)
9680	9700	9724

No. 2 Combination Boiler – F-Factor Calculation

Run 1	Run 2	Run 3
(9600 × .73)	(9600 × .73)	(9600 × .74)
(9190 × .22)	(9190 × .22)	(9190 × .21)
(8710 × .01)	(8710 × .01)	(8710 × .01)
+ (15,500 × .04)	+ (15,500 × .04)	+ (15,500 × .04)
9737	9737	9741

Combination Boiler No. 1

RUN NO. 1	% opacity % 26AI148.pv	Steam Load mpph 26cf142.pv	Bark tph c1bf_n.pv	Oil gpm 26fc143.pv	Gas mcfh 26fc144.pv	TDF tph 13sc001.pv
07/18/06 03:00 PM	7	266	28.1	12.6	0	1.3
07/18/06 03:06 PM	6	254	25.9	12.7	0	1.3
07/18/06 03:12 PM	5	238	23.3	12.6	0	1.3
07/18/06 03:18 PM	7	274	29.1	12.5	0	1.3
07/18/06 03:24 PM	10	282	31.4	12.5	0	1.3
07/18/06 03:30 PM	9	253	24.9	12.6	0	1.3
07/18/06 03:36 PM	7	299	33.8	12.6	0	1.3
07/18/06 03:42 PM	9	256	26.8	12.6	0	1.3
07/18/06 03:48 PM	5	258	27.9	11.8	0	1.3
07/18/06 03:54 PM	5	276	29.7	12.6	0	1.3
07/18/06 04:00 PM	5	272	29.4	12.6	0	1.3
07/18/06 04:06 PM	4	273	29.5	12.5	0	1.3
Average	7	267	28.3	12.5	0	1.3

			btu/hr
Bark	28.3 TPH	4350 btu / lb	246,280,835
Oil	12.5 GPM	148000 btu / gal	111,150,531
Gas	0 MCFH	1031 btu / cf	0
TDF	0.7 tph	15500 btu / lb	20,274,552
			377,705,917 total heat input

RUN NO. 2	% opacity % car195b.pv	Steam Load mpph ccf110.pv	Bark tph c1bf_n.pv	Oil gpm cfc117.pv	Gas mcfh cfc127.pv	TDF tph 13sc001.pv
07/18/06 04:42 PM	5	275.2	29.4	12.6	0	1.3
07/18/06 04:48 PM	6	292.3	32.5	12.6	0	1.3
07/18/06 04:54 PM	5	294.0	32.9	12.6	0	1.3
07/18/06 05:00 PM	4	267.3	28.2	12.5	0	1.3
07/18/06 05:06 PM	3	282.8	31.2	12.5	0	1.3
07/18/06 05:12 PM	3	275.4	29.7	12.5	0	1.3
07/18/06 05:18 PM	2	267.9	28.6	12.5	0	1.3
07/18/06 05:24 PM	2	262.2	27.6	12.6	0	1.3
07/18/06 05:30 PM	2	267.4	28.1	12.6	0	1.3
07/18/06 05:36 PM	2	289.3	31.7	12.6	0	1.3
07/18/06 05:42 PM	3	293.2	32.7	12.6	0	1.3
07/18/06 05:48 PM	3	290.9	32.2	12.6	0	1.3
Average	3	279.8	30.4	12.6	0	1.3

			btu/hr
Bark	30.4 TPH	4350 btu / lb	264,452,127
Oil	12.6 GPM	148000 btu / gal	111,584,775
Gas	0 MCFH	1031 btu / cf	0
TDF	0.7 tph	15500 btu / lb	20,276,130
			396,313,032 total heat input

RUN NO. 3	% opacity % car195b.pv	Steam Load mpph ccf110.pv	Bark tph c1bf_n.pv	Oil gpm cfc117.pv	Gas mcfh cfc127.pv	TDF tph 13sc001.pv
07/18/06 06:06 PM	4	299.8	33.9	12.6	0	1.3
07/18/06 06:12 PM	4	294.9	32.8	12.7	0	1.3
07/18/06 06:18 PM	3	297.8	33.3	12.7	0	1.3
07/18/06 06:24 PM	3	275.2	29.4	12.7	0	1.3
07/18/06 06:30 PM	2	304.5	34.5	12.7	0	1.3
07/18/06 06:36 PM	3	275.5	29.6	12.7	0	1.3
07/18/06 06:42 PM	2	297.6	33.2	12.6	0	1.3
07/18/06 06:48 PM	3	304.1	34.3	12.6	0	1.3
07/18/06 06:54 PM	3	292.4	32.4	12.6	0	1.3
07/18/06 07:00 PM	3	296.8	33.1	12.6	0	1.3
07/18/06 07:06 PM	3	286.4	31.2	12.7	0	1.3
07/18/06 07:12 PM	3	288.4	31.7	12.7	0	1.3
Average	3	292.8	32.4	12.7	0	1.3

			btu/hr
Bark	32.4 TPH	4350 btu / lb	282,258,988
Oil	12.7 GPM	148000 btu / gal	112,493,522
Gas	0.0 MCFH	1031 btu / cf	0
TDF	0.7 tph	15500 btu / lb	20,290,078
			415,042,588 total heat input

TDF is for both No. 1 and No. 2 Combination Boilers.

No. 1 Combination Boiler
EP Data

	Field 1		Field 2		Field 3	
	26ev0125.pv	26ea0125.pv	26ev0126.pv	26ea0126.pv	26ev0127.pv	26ea0127.pv
	Kv	Ma	Kv	Ma	Kv	Ma
07/18/06 03:10 PM	27.78	102.11	21.73	120.10	21.94	179.89
07/18/06 03:25 PM	28.02	126.94	22.32	134.76	21.80	178.79
07/18/06 03:40 PM	27.32	153.99	22.38	142.71	22.26	194.15
07/18/06 03:55 PM	26.85	140.67	23.75	191.88	22.97	202.15
07/18/06 04:10 PM	26.38	137.59	24.26	201.31	23.34	226.15
07/18/06 04:25 PM	27.55	125.65	24.53	180.32	23.98	207.88
07/18/06 04:40 PM	25.87	128.65	24.24	168.99	23.57	192.51
07/18/06 04:55 PM	26.44	144.91	25.31	236.14	24.47	257.13
07/18/06 05:10 PM	25.72	137.97	25.33	247.09	26.33	337.94
07/18/06 05:25 PM	25.78	122.60	24.00	180.67	26.24	307.81
07/18/06 05:40 PM	26.62	119.40	24.65	163.36	27.28	304.34
07/18/06 05:55 PM	27.60	121.93	24.04	146.58	26.44	259.37
07/18/06 06:10 PM	27.31	133.37	25.54	195.69	26.34	246.60
07/18/06 06:25 PM	27.18	134.83	25.10	182.73	26.45	261.62
07/18/06 06:40 PM	26.29	122.60	25.43	179.31	25.65	214.17
07/18/06 06:55 PM	26.93	120.25	24.98	162.22	26.40	234.48

No. 2 Combination Boiler
Process Data

Combination Boiler No. 2

RUN NO. 1	% opacity % 37ai293b.p	Steam Load mpph 37cf278.pv	Bark tph c2bf.pv	Oil gpm 37fc280.pv	Gas mcfh 37fc281.pv	TDF tph 13sc001.pv
07/18/06 09:48 AM	6	285.7	39.8	12	4.0	1.3
07/18/06 09:54 AM	6	279.5	38.2	12	4.0	1.3
07/18/06 10:00 AM	9	286.8	39.2	12	4.1	1.3
07/18/06 10:06 AM	7	278.0	37.9	12	4.2	1.3
07/18/06 10:12 AM	8	287.9	39.0	12	4.3	1.3
07/18/06 10:18 AM	7	296.9	41.6	12	4.3	1.3
07/18/06 10:24 AM	10	306.8	41.6	12	4.3	1.3
07/18/06 10:30 AM	11	329.9	46.6	12	4.1	1.3
07/18/06 10:36 AM	6	304.6	42.9	12	3.9	1.3
07/18/06 10:42 AM	8	323.3	45.2	12	3.9	1.3
07/18/06 10:48 AM	7	325.7	46.4	12	4.0	1.3
07/18/06 10:54 AM	8	308.2	42.8	12	4.1	1.3
Average	8	301.1	41.8	12	4.1	1.3

			btu/hr	
Bark	41.8 TPH	4350 btu / lb	363,279,472	
Oil	12 GPM	148000 btu / gal	108,518,717	
Gas	4.1 MCFH	1031 btu / cf	4,230,770	
TDF	0.7 tph	15500 btu / lb	20,276,663	
			496,305,621	total heat input

RUN NO. 2	% opacity % 37ai293b.p	Steam Load mpph 37cf278.pv	Bark tph c2bf.pv	Oil gpm 37fc280.pv	Gas mcfh 37fc281.pv	TDF tph 13sc001.pv
07/18/06 11:30 AM	9	325.5	46.7	12	4.0	1.3
07/18/06 11:36 AM	8	295.9	41.1	12	4.1	1.3
07/18/06 11:42 AM	8	293.5	39.4	12	4.2	1.3
07/18/06 11:48 AM	17	328.8	45.6	12	4.2	1.3
07/18/06 11:54 AM	11	330.4	47.3	12	4.0	1.3
07/18/06 12:00 PM	6	314.0	44.3	12	4.2	1.3
07/18/06 12:06 PM	5	290.3	39.1	12	4.3	1.3
07/18/06 12:12 PM	8	314.9	44.0	12	4.3	1.3
07/18/06 12:18 PM	7	304.4	42.6	12	4.1	1.3
07/18/06 12:24 PM	9	310.7	43.4	12	4.1	1.3
07/18/06 12:30 PM	5	237.1	34.0	12	4.2	1.3
07/18/06 12:36 PM	5	238.2	27.6	12	4.4	1.3
Average	8	298.6	41.3	12	4.2	1.3

			btu/hr	
Bark	41.3 TPH	4350 btu / lb	358,976,702	
Oil	12 GPM	148000 btu / gal	109,005,828	
Gas	4.2 MCFH	1031 btu / cf	4,306,042	
TDF	0.7 tph	15500 btu / lb	20,271,886	
			492,560,458	total heat input

RUN NO. 3	% opacity % 37ai293b.p	Steam Load mpph 37cf278.pv	Bark tph c2bf.pv	Oil gpm 37fc280.pv	Gas mcfh 37fc281.pv	TDF tph 13sc001.pv
07/18/06 01:12 PM	9	292.7	39.5	12	4.0	1.3
07/18/06 01:18 PM	7	292.8	41.3	12	4.0	1.3
07/18/06 01:24 PM	8	300.5	41.1	12	4.0	1.3
07/18/06 01:30 PM	10	301.8	42.2	12	4.0	1.3
07/18/06 01:36 PM	14	326.8	44.3	12	4.0	1.3
07/18/06 01:42 PM	12	331.4	48.6	12	4.0	1.3
07/18/06 01:48 PM	9	318.4	44.7	12	4.1	1.3
07/18/06 01:54 PM	9	322.5	46.1	12	4.1	1.3
07/18/06 02:00 PM	11	325.9	46.5	12	4.1	1.3
07/18/06 02:06 PM	8	314.5	45.1	12	4.1	1.3
07/18/06 02:12 PM	8	317.0	45.1	12	4.1	1.3
07/18/06 02:18 PM	7	318.0	46.0	12	4.1	1.3
Average	9	313.5	44.2	12	4.1	1.3

			btu/hr	
Bark	44.2 TPH	4350 btu / lb	384,567,883	
Oil	12 GPM	148000 btu / gal	108,615,189	
Gas	4.1 MCFH	1031 btu / cf	4,178,081	
TDF	0.7 tph	15500 btu / lb	20,274,552	
			517,635,706	total heat input

TDF is for both No. 1 and No. 2 Combination Boilers.

No. 2 Combination Boiler
EP Data

	Field 1		Field 2		Field 3	
	37ev020b.pv	37ea020a.pv	37ev021b.pv	37ea021a.pv	37ev022b.pv	37ea022a.pv
	Kv	Ma	Kv	Ma	Kv	Ma
07/18/06 09:30 AM	25.93	14.39	26.13	10.62	13.48	34.31
07/18/06 09:45 AM	26.41	13.56	26.71	10.47	13.91	35.25
07/18/06 10:00 AM	26.72	12.71	27.32	10.35	14.03	34.29
07/18/06 10:15 AM	27.28	12.53	27.70	10.26	14.41	34.15
07/18/06 10:30 AM	26.35	13.92	26.52	10.30	13.16	34.76
07/18/06 10:45 AM	26.18	13.85	26.47	10.12	13.47	34.31
07/18/06 11:00 AM	26.02	12.98	25.83	10.13	13.16	35.30
07/18/06 11:15 AM	27.27	12.29	27.65	10.12	13.97	33.69
07/18/06 11:30 AM	25.70	13.60	26.73	10.56	13.24	35.08
07/18/06 11:45 AM	27.10	12.25	27.52	10.30	13.81	33.79
07/18/06 12:00 PM	25.42	14.25	25.58	10.67	12.65	34.52
07/18/06 12:15 PM	25.73	13.58	26.31	10.17	12.89	34.51
07/18/06 12:30 PM	25.07	14.42	25.68	10.15	12.28	35.60
07/18/06 12:45 PM	25.15	13.69	25.81	10.09	12.81	34.34
07/18/06 01:00 PM	25.41	13.61	26.34	10.25	12.91	33.99
07/18/06 01:15 PM	25.71	13.02	26.38	10.03	12.74	34.90
07/18/06 01:30 PM	26.08	13.72	26.89	9.63	13.24	33.80
07/18/06 01:45 PM	25.74	12.80	26.56	9.93	12.89	34.35
07/18/06 02:00 PM	26.28	11.82	26.83	9.26	12.84	33.81
07/18/06 02:15 PM	25.83	12.46	25.93	9.69	12.28	33.77